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REVIEW OF THE ANNELID WORMS OF THE FAMILY NEPHTYIDAE FROM THE NORTHEAST PACIFIC, WITH DESCRIPTIONS OF FIVE NEW SPECIES

By Olga Hartman

The Nephtyidae of the northeast Pacific are known to be represented by a single genus, *Nephtys* Cuvier. Five species of *Nephtys* have been reported from California, all of them typically polar Atlantic or circumpolar forms, with type localities as follows: *N. caeca* (Fabricius), Greenland; *N. ciliata* (O. F. Müller), Norway; *N. assimilis* Malmgren, Norway; *N. incisa* Malmgren, Norway; and *N. malmgreni* Théel, Novaya Zemlya. Thus, even at first glance, it is evident that the records for California should be examined critically. Probably only one of these species, *N. caeca*, is present in California, and that one seemingly rare; whereas two others, *N. ciliata* and *N. malmgreni*, are present in more northern Pacific waters. Doubts as to the identifications of *N. caeca* have already been expressed (Moore, 1909 and 1911; Monro, 1933; and others). In some cases differences have been described that have made it possible to identify the specimens in question with species treated herein.

Materials used.—Through the courtesy of the United States National Museum, its entire collection of west coast Nephtyidae was placed at my disposal. This collection contains most of the species herein treated. In addition, there were numerous collections in the zoology department of the University of California, chiefly from southern California. Others, made by E. F. Ricketts from Alaska and Puget Sound, were of great help. Still others, collected during

the past four years by members of the classes of invertebrate zoology of the University of California, were obtained chiefly from the littoral zones of northern California. These collections have permitted the examination of several hundred individuals.

Acknowledgments.—I wish to express appreciation particularly to Dr. Waldo L. Schmitt, of the United States National Museum, and to E. F. Ricketts, of Pacific Grove, Calif., for making available many of the collections used; also to C. C. A. Monro, of the British Museum, for labeled collections of European species of *Nephtys*.

Holotypes of new species are deposited in the United States National Museum; paratypes in the University of California.

Terminology.—Recurved cirrus is herein used to designate the ventral outgrowth of the dorsal cirrus (=branchia or branchial cirrus of some authors). *Terminal bifid papillae* are the distal, bifurcated outgrowths of the dorsal and ventral lips of the proboscis; the *median dorsal papilla* (when present) is the more or less elongate, unpaired papilla inserted between the terminal and subterminal papillae. The wartlike or hooklike elevations sometimes present on the proximal portion of the proboscis [höckerartigen Papillen of Ehlers (1868, p. 624)] are not designated papillae, since they bear no resemblance to the so-called more distal outgrowths.

SPECIES OF NEPHTYS FROM THE NORTHEAST PACIFIC, WITH KNOWN DISTRIBUTION

1. *Nephtys caeca* (FABRICIUS): Circumpolar; northeast Pacific south to central California (rare).
   Nereis caeca FABRICIUS, 1780, p. 304 (Greenland).
   Nephthys caeca EHLERS, 1864–68, p. 588 (Gulf of Georgia).—JOHNSON, 1910, p. 401 (part) (Alaska, Puget Sound).—MOORE, 1908, p. 341 (Alaska).—TREADWELL, 1914, p. 192 (part); 1926, p. 4 (Alaska).—CHAMBERLIN, 1919, p. 255 (Gulf of Georgia).—BERKELEY, 1924, p. 290 (British Columbia).
   non MOORE, 1909, p. 243; 1911, p. 243; 1923, p. 257.—HILTON, 1919, p. 27 (?).
2. *Nephtys ciliata* (O. F. MÜLLER): Circumpolar.
   Nereis ciliata MÜLLER, 1789, p. 14 (Norway).
   Nephthys ciliata MOORE, 1908, p. 341 (Alaska).—CHAMBERLIN, 1920, p. 9B (north circumpolar).—BERKELEY, 1924, p. 290 (British Columbia).
   ? *non* BERKELEY, 1935, p. 770 (Elkhorn Slough, Calif.).
3. *Nephtys dibranchis* GRUBE: Tropical and subtropical Pacific.
   (See p. 146 for distribution details.)
4. *Nephtys magellanica* AUGENER: Southeastern Pacific north to San Diego Bay.
   (See p. 146 for distribution details.)
5. *Nephtys malmgreni* THÉEL: Behm Canal, Alaska: Circumpolar.
   THÉEL, 1879, p. 26 (Novaya Zemlya).—MOORE, 1908, p. 342 (Alaska, dredged).—? TREADWELL, 1914, p. 192 (southern California).
6. *Nephtys caecoides*, new species: California (littoral); Lower California; Washington (rare).

7. *Nephtys californiensis*, new species: California (littoral to 20 fathoms).
8. *Nephtys schmitti*, new species: Northeast Pacific (dredged).
9. *Nephtys rickettsi*, new species: Northeast Pacific.
10. *Nephtys punctata*, new species: Alaska south to Monterey Bay.

KEY TO THE SPECIES OF NEPHTYS FROM THE NORTHEAST PACIFIC

1. Recurved cirri involute 2
   Recurved cirri not involute, some curved outward (fig. 63, *g*) 3
2. Recurved cirri developed at fourth or fifth setiger; proboscis distally with 22 rows of papillae; lyre setae present; neuropodium with a slender, superior lobe ..... dibranchis
   Recurved cirri first developed after tenth setiger; proboscis distally with 14 rows of papillae; lyre setae absent; neuropodium without superior lobe ..... malmgreni
3. Recurved cirri flattened, foliaceous between segments 14 to 35 (fig. 65, *c*); proboscis proximally smooth ..... schmitti
   Recurved cirri cirriform or thickened, not foliaceous 4
4. Recurved cirri thick, blunt, digitate in postmedial region (fig. 66, *c*); proboscis proximally obsoletely wartlike; postsetal lobes thick, fleshy, well developed in median region (fig. 66, *b*) ..... rickettsi
   Recurved cirri cirriform or sickle-shaped (fig. 63, *g*) 5
5. Recurved cirri present from tenth or eleventh setiger, absent from posterior fifth of body; proboscis proximally covered with minute, conical, chitinous prickles ..... punctata
   Recurved cirri present from third or fifth setiger to posterior end 6
6. Neuropodial acicular lobe bluntly conical or rounded (fig. 62, *c*, *d*) ..... magellanica
   Neuropodial acicular lobe bilobed (fig. 63, *g*) 7
7. Proboscis proximally smooth, glistening 9
   Proboscis proximally covered with low, coarse, wartlike processes or minute conelike elevations 8
8. Proboscis with a median dorsal papilla; recurved cirri reduced on last 20 or 30 setigers; postsetal lamellae not conspicuous ..... ciliata
   Proboscis without median dorsal papilla; recurved cirri present to posterior end; postsetal lamellae large, thin, foliaceous ..... caeca
9. Proboscis with median dorsal papilla; recurved cirrus present from fourth setiger; setae stiff, dusky, held stiffly from side of body ..... caecoides
   Proboscis usually without a median dorsal papilla; recurved cirrus present from third setiger; setae soft, silky, flowing ..... californiensis

Genus NEPHTYS Cuvier

Nephtys Cuvier, 1817, p. 173.
Nephthys Savigny, 1822, p. 12.

The spelling *Nephtys* is used herein in place of the more widely used *Nephthys* because the former has priority. Cuvier erected the genus for the species *N. hombergi*. In his table of contents (p. xxviii) he also spelled the name *Nephtis*.

NEPHTYS DIBRANCHIS Grube

Nephthys dibranchis GRUBE, 1878, p. 536.—McINTOSH, 1885, p. 161 (New Guinea).—AUGENER, 1922, p. 17 (Ecuador, New Zealand).—MONRO, 1933, p. 56 (Gorgona Island).

?*Nephthys mirasetis* HOAGLAND, 1920, p. 610 (Philippine Islands).

Parapodial arrangement agreeing with that described by Augener (1922) and Monro (1933). Proboscis provided with 22 rows of papillae as described by Monro, 7 or 8 papillae in each row. Entire proboscis minutely and closely covered with prickles. Readily distinguished by its involute recurved cirri, its lyre setae, and the type of structure of the presetal and postsetal lamellae.

Numerous specimens from *Albatross* station 2838 (1888), off Lower California, in 44 fathoms. This is the northernmost record for *N. dibranchis*. Its range is hereby extended to include probably also the Philippine Islands (Hoagland).

Discussion.—Monro (1933, p. 56) has already commented on the discrepancies in the descriptions of *N. dibranchis* as given by McIntosh (1885, pp. 161, 163) and Augener (1922, p. 18) and of individuals he described from Gorgona Island. The description of *N. mirasetis* Hoagland (1920, p. 610) presents other difficulties in that lyre setae were not described for it. These may have been overlooked. Its proboscis has 22 rows of papillae (Hoagland, pl. 48, fig. 5), agreeing therein with the individuals described from Gorgona Island and Lower California. The parapodial arrangement of *N. mirasetis* (pl. 48, fig. 6) agrees well with that for *N. dibranchis* Grube.

NEPHTYS MAGELLANICA Augener

FIGURE 62

Nephthys magellanica AUGENER, 1912, p. 208.

Nephthys cirrosa var. EHLERS, 1901, p. 67 (*non* Ehlers, 1864–68, p. 624) and *N. longosetosa* Ehlers, 1901, p. 67 (*non* Ørsted, 1843, p. 195). (*Fide* Augener, 1912, p. 208.)

Nephthys incisa TREADWELL, 1914, p. 193. (*Non* Malmgren, 1865, p. 105.)

Additional description.—Length to 100 mm; number of segments 120–150. Prostomium as in figure 62, *a*. Recurved cirri present from third setiger, these never long (fig. 62, *b–d*), at most extending to near middle of parapodia, and only slightly curved outward. Median dorsal papilla of proboscis similar to the larger paired subterminal papillae. Proboscis smooth on its proximal part. Setae long, silky, somewhat flowing or recumbent at sides.

Distribution.—San Diego Bay, southern California; the Straits of Magellan and Chile (Augener).

Discussion.—Augener (1912, p. 210) indicated the affinities of *N. magellanica* with *N. cirrosa* Ehlers, stating that the former may be

thought of as a geographical, southwest American subspecies of *N. cirrosa*. There are several significant differences between the two species: (1) Recurved cirri are present from the third setiger in *N. magellanica*, from the fourth setiger in *N. cirrosa;* (2) the proboscis is proximally smooth in *N. magellanica*, prickly in *N. cirrosa* (cf. Ehlers, 1868, pl. 23, fig. 6); (3) *N. magellanica* consists of 120 to 150 segments, *N. cirrosa* of 90 to 95 segments.

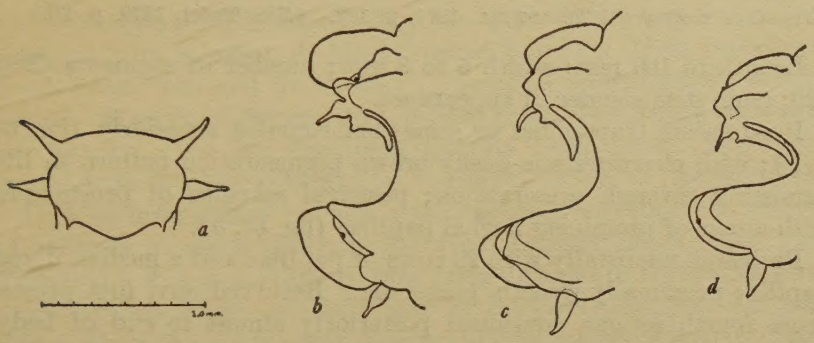

FIGURE 62.—*Nephtys magellanica* Augener: *a*, Outline of dorsal surface of prostomium; *b*, third parapodium in anterior view; *c*, thirty-sixth parapodium in anterior view; *d*, sixtieth parapodium in anterior view.

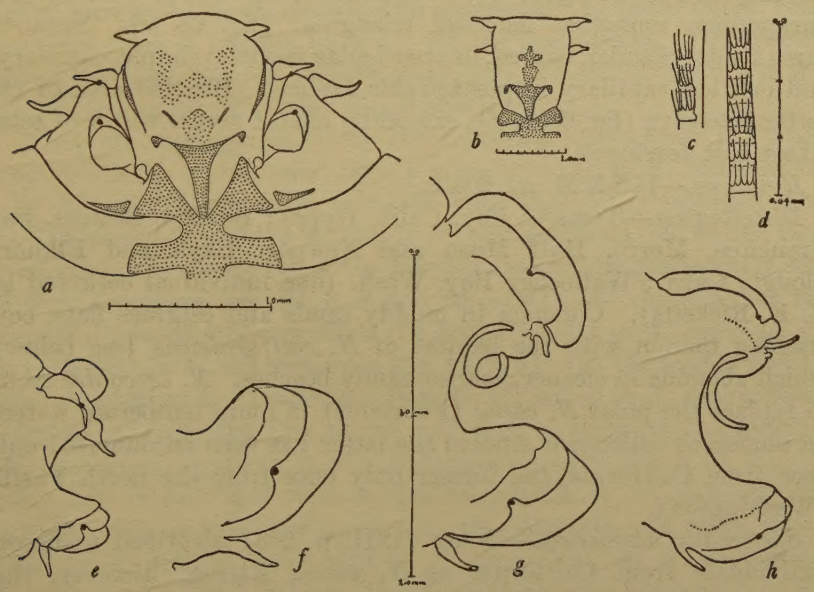

FIGURE 63.—*Nephtys caecoides*, new species: *a*, Prostomium and first segment in dorsal view (from an individual with proboscis protruded); *b*, same, from an individual with proboscis retracted); *c*, portion of a bristled postlamellar seta seen somewhat from the side; *d*, same, in face view; *e*, third parapodium in anterior view; *f*, neuropodium of fiftieth setiger in anterior view; *g*, twenty-fifth parapodium in anterior view; *h*, fifteenth last parapodium in anterior view.

NEPHTYS CAECOIDES, new species

FIGURE 63

Nephthys coeca JOHNSON, 1901, p. 401 (part).
Nephthys caeca MOORE, 1909, p. 243; 1911, p. 243; 1923, p. 257 (part).—? TREADWELL, 1914, p. 192 (part).—? HILTON, 1919, p. 27. (*Non* Fabricius, 1780, p. 304.)
Nephthys assimilis TREADWELL, 1914, p. 193 (part). (*Non* Malmgren, 1865, p. 105.)
?*Nephthys malmgreni* TREADWELL, 1914, p. 192. (*Non* Théel, 1879, p. 26.)

Length to 100 mm; width 5 to 8 mm; number of segments about 120; trim, stiff, slender in appearance.

Prostomium trapezoidal or somewhat rounded anteriorly (fig. 63, *a*, *b*); with characteristic dusky brown pigmentation pattern in life, persisting through preservation; postectal margins of prostomium with a pair of prominent nuchal papillae (fig. 63, *a*).

Proboscis subdistally with 22 rows of papillae and a median dorsal papilla; proximally smooth, glistening. Recurved cirri first present from fourth setiger, continued posteriorly almost to end of body; fifteenth last segment as in figure 63, *h*. Recurved cirri exceeding their respective dorsal cirri except in last nine segments, where recurved cirri are smaller than dorsal cirri.

Parapodia as in figure 63, *e–h*; dorsal and ventral cirri of first parapodium somewhat flattened triangular (fig. 63, *e*). Setae of three kinds: Slender, barred, in preacicular fascicle; simple, capillary; and bristled, capillary in postacicular fascicle. Bristled area of the latter extensive (fig. 63, *c*, *d*), extending almost across width of setae where best developed.

Holotype.—U.S.N.M. no. 20319.

Distribution.—Tomales Bay, Calif. (type); Bodega, Bolinas, San Francisco, Morro, Half Moon and Newport Bays, and Elkhorn Slough, Calif.; Wallochey Bay, Wash. (one individual collected by E. F. Ricketts). Common in muddy sands and eelgrass flats, contrasting therein with the habitat of *N. californiensis* (see below), which abounds in cleaner, coarser sandy beaches. *N. caecoides* seems to replace the polar *N. caeca* (Fabricius) in more temperate waters. In numerous collections studied the latter has been encountered only once from California, the former only once from the north Pacific (Washington).

Systematic discussion.—Moore (1911, p. 243) identified numerous individuals from California as *N. caeca*, stating, however, that "scarcely a single specimen can be said to be typical *N. caeca*," and "I am by no means convinced that more than one species may not be represented." Monro (1933, p. 51) described a *Nephthys* sp. as a tropical representative of *N. caeca* but said that it showed certain differences from the typical form. Johnson's *N. coeca* (1901, p. 401)

includes at least two species, *N. caeca*, from Alaska and Puget Sound, and *N. caecoides*, from San Francisco. Johnson designated the California specimens as "pygmies." *N. caecoides* is notably smaller than *N. caeca* (cf. measurements above).

N. caeca of Moore (1909, p. 243) includes at least two species, probably *N. caecoides*, from San Diego, represented by "examples of small to medium size and colorless or slightly marked with brown figures and bands on the prostomium and a few anterior segments"; and *N. californiensis*, from Monterey Bay, the latter "much larger . . . prostomium with a brown or black 'spread eagle' . . . free margins of prostomium thin and produced . . . serrated setae forming flowing tufts." *N. caeca* of Moore (1911, p. 243) probably includes these same two species. The two specimens (station 4482, Santa Cruz Lighthouse) with involute gills may be *N. dibranchis* Grube (see page 146).

Lack of information renders it impossible to ascertain the identity of Hilton's *N. caeca* (1919, p. 27) from Laguna Beach, Calif., and Treadwell's *N. caeca* (1914, p. 192) from "Alaska to Humboldt Bay."

Comparison of N. caecoides *and* N. californiensis (see also page 150).—These two are the only common littoral species of *Nephtys* found in numerous field collections from California. They sometimes occur in the same beaches, almost side by side, but more usually are segregated on the basis of substratum (see page 151). They resemble each other strikingly in (1) trapezoidal outline of the prostomium (compare fig. 63, *a*, *b*, and fig. 64, *a*, *b*), (2) the proportions of the acicular lobes (see figs. 63, *f–h* and 64, *f–h*), (3) the bathymetric and geographical ranges (see under distributions).

They are distinguishable by the following characters: (1) Posterior, postsetal, neuropodial lamellae are truncate in *N. californiensis* (fig. 64, *h*), rounded in *N. caecoides* (fig. 63, *h*); (2) recurved cirrus is first present on third setiger in *N. californiensis*, on fourth in *N. caecoides;* (3) the extent of the bristled area of the postacicular setae differs (compare figs. 63, *c*, *d* and 64, *c*, *d*); (4) the superior neuropodial lobe closely surrounds the superior setae in *N. caecoides* and is collarlike in *N. californiensis* (fig. 64, *f*, *g*); (5) the nuchal papillae are conspicuous in *N. caecoides* (fig. 63, *a*), not so in *N. californiensis* (fig. 64, *a*); (6) the first dorsal and ventral cirri are triangular in *N. caecoides*, cirriform in *N. californiensis* (figs. 63, *a*, 64, *a*); (7) proboscis is provided with a median papilla in *N. caecoides* and usually without in *N. californiensis*; (8) setae are soft, silky, recumbent in *N. californiensis*, stiff in *N. caecoides;* (9) *N. caecoides* is usually steel to dark gray in life, *N. californiensis* pearl-gray to pale white; (10) the color patterns of the dorsal surface of the prostomium differ (see figs. 63, *a*, *b*, and 64, *a*, *b*); and (11) *N. caecoides* is usually considerably smaller than *N. californiensis* (cf. measurements, pp. 148 and 150).

NEPHTYS CALIFORNIENSIS, new species

FIGURE 64

Nephthys caeca MOORE, 1909, p. 243 (part). (See p. 148 herein.)
?*Nephthys caeca ciliata* BERKELEY, 1935, p. 770.
?*Nephthys assimilis* TREADWELL, 1914, p. 193 (part).

Length 130 to 300 mm; width 6 to 10 mm in anterior third or widest part; number of segments 100 to 160; broad, depressed, tapering gradually posteriorly to a slender, caudal end. Segments marked by faint, segmental lines dorsally and ventrally.

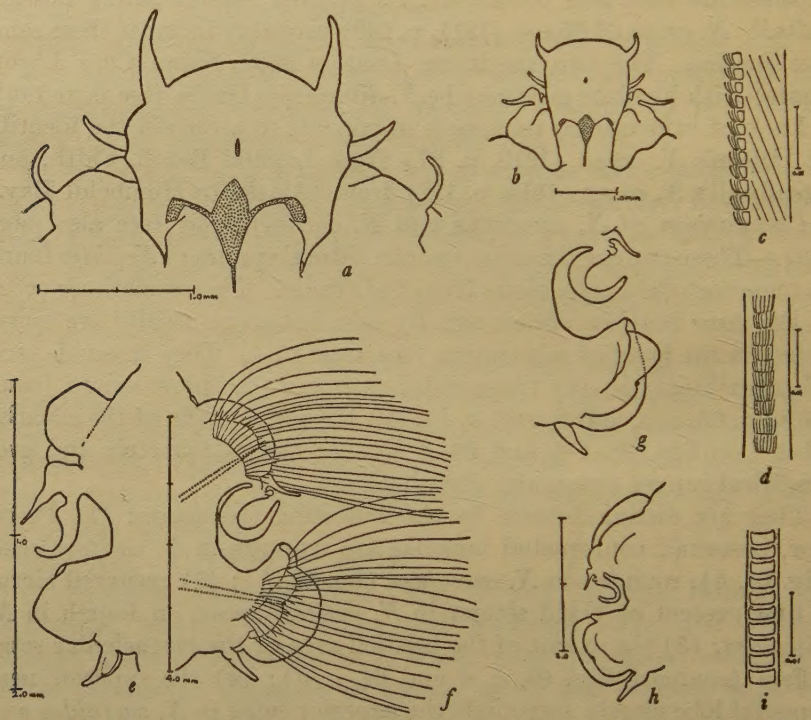

FIGURE 64.—*Nephtys californiensis*, new species: *a*, Prostomium and part of first segment in dorsal view (from an individual with proboscis protruded); *b*, same, from an individual with proboscis retracted; *c*, portion of a bristled, postlamellar seta seen somewhat from the side; *d*, same, in face view; *e*, third parapodium in posterior view; *f*, twenty-fifth parapodium in anterior view (setae diagrammatically represented); *g*, recurved cirrus and neuropodium of seventy-fifth parapodium in anterior view; *h*, a posterior parapodium; *i*, portion of a barred, prelamellar seta.

Prostomium roughly trapezoidal, widest anteriorly (fig. 64, *a*, *b*), anterior margin rounded, spatulate; frontal antennae inserted at widest part of anterior margin. A characteristic pigmented patch on posterior third, what Moore (1909, p. 243) has designated a "spread eagle" (fig. 64, *a*, *b*). Nuchal papillae slitlike, hardly visible.

Proboscis large, clavate, usually without a median papilla (rarely one of the paired papillae seems to occupy a median position); subdistally with 22 rows of papillae, 6 to 8 in a row, the more distal ones about as long as those of the terminal forked set. Proximal portion of proboscis smooth, glistening.

Parapodia well developed throughout; over half as long as body is wide; provided with many silky, flowing setae, directed caudally. Parapodial lamellae distinct. Dorsal and ventral cirri of first parapodium subulate, exceeding in size the frontal antennae; notopodium with lamellae, aciculum, and preacicular and postacicular fascicles of setae; neuropodium with reduced setal fascicle and minute aciculum. Second parapodium differing from first in shape of dorsal and ventral cirri, which are triangular with acute apex, and in having a larger neuropodium.

Recurved cirrus present from third setiger (fig. 64, *e*) to posterior end of body; with a small spherical papilla at its base near its origin from the dorsal cirrus (fig. 64, *f–h*). Dorsal and ventral cirri with thickened basal portion (fig. 64, *e–h*).

Notopodial acicular notch present throughout but more or less obsolete in posteriormost neuropodia (fig. 64, *h*). Postacicular lamellae broad, subtruncate (fig. 64, *g*, *h*); superior portion of median neuropodial lamellae surrounding setal fascicle with a loose, high collar (fig. 64, *f–h*).

Setae of three kinds: A few plain capillary setae in superior and inferior parts of postacicular notopodia and neuropodia; numerous long, bristled, barred capillary postacicular notosetae and neurosetae (fig. 64, *c*, *d*), and shorter, nonbristled, barred, capillary, preacicular notosetae and neurosetae (fig. 64, *i*).

Color in life iridescent pearl-gray to pale whitish.

Holotype.—U.S.N.M. no. 20320.

Distribution.—Dillon Beach, Calif. (type); northern and southern California. Inhabiting clean, sandy beaches (see also p. 149).

Systematic position.—Differing from *N. ciliata* (O. F. Müller) in having proboscis proximally smooth, in lacking (usually) the median dorsal papilla on the subdistal portion of the proboscis, in the distribution of its recurved cirri which are present almost to the end of the body, and in the proportions of the prostomium (see fig. 64, *a*, *b*).

Discussion.—*Nephthys caeca ciliata* of Berkeley (1935, p. 770) is included here because of the "absence of an unpaired papilla on the proboscis" and because the "posterior setae are unusually long". Also its distribution (Elkhorn Slough) falls within the range of *N. californiensis* as outlined above.

NEPHTYS SCHMITTI, new species

FIGURE 65

Length 80 to 90 mm; width about 8 mm at widest part or tenth setiger; number of segments about 100. Prostomium about twice as broad as long, broadly pentagonal (fig. 65, *a*), with a shallow, median concavity in its anterior half. Prostomial antennae bluntly conical, subequal, inserted at antero-ectal margin of prostomium. Nuchal papillae near posterior margin of prostomium in line with prostomial antennae (fig. 65, *a*).

Proboscis proximally smooth except for longitudinal wrinkles of contraction; subdistally with 22 rows of papillae, 4 to 6 in a row; without median dorsal papilla.

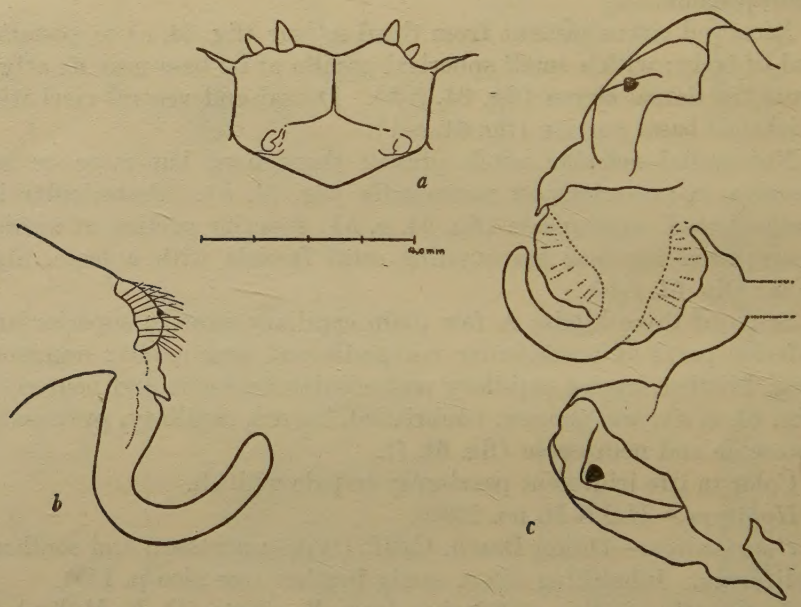

FIGURE 65.—*Nephtys schmitti*, new species: *a*, Outline of prostomium in dorsal view; *b*, notopodium of thirty-eighth parapodium in anterior view; *c*, twenty-first parapodium in anterior view (the two rami somewhat separated).

Recurved cirri present from seventh setiger, minute at first. Dorsal and recurved cirri about equal at ninth setiger. More posteriorly recurved cirri elongate and thickened; at twelfth setiger foliaceous processes arise laterally from recurved cirri and become well developed by fourteenth (fig. 65, *c*). Foliaceous lobes disappear from about thirty-sixth setiger; thereafter cirri are digitate and somewhat outwardly curved (fig. 65, *b*), continuing large to ninth last setiger, then abruptly reduced to a minute knob and absent from last eight setigers.

Parapodial lamellae poorly developed throughout, greatly reduced in posterior half of body; acicular lobes conical (fig 65, *b*, *c*); parapodial rami widely diverging after the thirty-sixth setiger.

Setae not conspicuous, consisting of smaller, prelamellar, barred setae and postlamellar simple capillary and bristled capillary setae, the latter with bristled area limited to a short, narrow region where setae emerge from parapodial lobes.

Dorsal anal cirrus as long as last 11 setigers; ventral anal cirrus tiny, somewhat longer than width of anal ring.

Named for Dr. Waldo L. Schmitt, of the United States National Museum.

Holotype.—U.S.N.M. no. 20323.

Distribution.—*Albatross* station 3210 (1890) south of the Alaska Peninsula, in 483 fathoms (type); station 3198 (1890) off central California, in 278 fathoms; station 3195 (1890) off central California, in 252 fathoms; station 2871 (lat. 46°55′ N., long. 125°11′ W.), in 559 fathoms.

Systematic discussion.—*Nephtys schmitti* has affinities with *N. phyllobranchia* McIntosh and probably also with *N. modesta* Grube. *N. phyllobranchia* McIntosh (1885, p. 164) was described from off New York in 1,240 fathoms. The description fails to give the nature of anterior and posterior recurved cirri unless they are understood to be foliaceous throughout. Such is not the case in *N. schmitti.* The number and distribution of papillary rows on the proboscis are not given except to say that *N. phyllobranchia* "approaches *N. modesta* Grube." According to Grube (1878, p. 535), *N. modesta* is provided with 12 rows of papillae. *N. schmitti* has 22 rows. Furthermore, *N. schmitti* differs from *N. modesta* in the structure of its recurved cirri. In the latter "branchiae pinnarum posteriorum brevissimae triangulae," in *N. schmitti* they are long, digitiform (fig. 65, *b*). Grube could not have referred to the last few setigers, for he had an incomplete individual of 56 segments.

Grube's species was recorded from the Indian Ocean (Kerguelen) in one place (1878, p. 535) and from the Straits of Magellan in another (p. 511). According to Ehlers (1901, p. 68) the former record is probably an error.

NEPHTYS RICKETTSI, new species

FIGURE 66

Large, robust; length to 30 cm; width to 18 mm; number of segments 110 to 120. Prostomium wider than long, broadly subtrapezoidal, its anterior margin gently curved; a deep, median, longitudinal groove extending over most of its length. Dorsal frontal antennae less than half as large as ventral antennae, the two of a

side inserted close together and widely separated from those of the other side. Nuchal papillae conspicuous, at postectal margin of prostomium.

Proboscis subdistally beset with 22 rows of papillae, 4 or 5 in a row; without median papilla; proximally covered with low, elongated, wartlike elevations, which are more like wrinkles than papillae.

Recurved cirrus first present as minute swelling on ventral side of dorsal cirrus of sixth setiger, becoming elongate triangular by tenth setiger; proximal two-thirds of cirrus thickened at twenty-third setiger, continuing gradually thicker, appearing inflated, maximum development between setigers 35–48; slenderer posteriorly, also shorter; absent from about 17 last setigers.

FIGURE 66.—*Nephtys rickettsi*, new species: *a*, An anterior parapodium in anterior view, with setae shown; *b*, thirty-fifth parapodium (slightly anterior to middle of body) in anterior view; *c*, a posterior parapodium in anterior view, with setae shown.

Parapodia robust, with large, imbricated, fleshy lamellae and cirri in median region. First parapodium directed anteriorly, enclosing prostomium from side; its dorsal and ventral cirri somewhat elongated, ventral cirrus roughly triangular; its notopodium with stout aciculum and well-developed setal fascicle; its neuropodium with reduced aciculum and fewer setae than are present in more posterior parapodia. Dorsal and ventral cirri of first few (five or more) segments subglobular (fig. 66, *a*). Median parapodia with broad, thick rami, acicular lobes unequally bilobed (fig. 66, *b*); postsetal lamellae broad, thick, foliaceous. Posterior parapodia plain, the rami widely diverging, lobes not noticeably developed, acicular lobes hardly discernible, the stout aciculum emerging from anterior face of parapodial lamella (fig. 66, *c*).

Setal fascicles not conspicuous, containing only simple capillary, simple bristled and simple barred setae. Setae few in fascicles, projecting laterally in stiff series.

Named for E. F. Ricketts, who has made numerous collections of annelids from the northeast Pacific.

Holotype.—U.S.N.M. no. 20322.

Distribution.—Cache Bay, Alaska (type), collected by Mr. Ricketts, with an individual of *N. caeca* (Fabricius). *Albatross* station 2902 (1889), off Santa Rosa Island, in 53 fathoms.

Systematic position.—*N. rickettsi* has affinities with the *N. caeca* group. It differs from the latter or closely related species in (1) the distribution of its recurved cirri, which are first present on the sixth setiger and absent from about the last 15 or more setigers; (2) in the shape of its recurved cirri, especially those of the posterior half of the body, these being inflated, sacklike; (3) in the nature of the parapodial lamellae, which are thicker, tougher; and (4) in the posterior acicular lobes which are not noticeably bilobed.

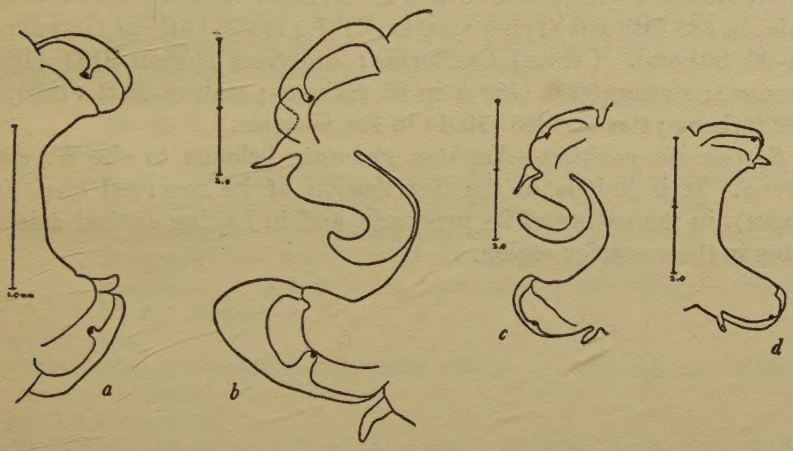

FIGURE 67.—*Nephtys punctata*, new species: *a*, Sixth parapodium in anterior view, ventral cirrus omitted; *b*, twenty-fifth parapodium in anterior view; *c*, parapodium from median region, in anterior view; *d*, twentieth last parapodium, in anterior view.

NEPHTYS PUNCTATA, new species

FIGURE 67

Length to 100 mm; width to 6.5 mm at tenth setiger or widest part; number of segments 90 to 100. Closely resembling *N. caeca* (Fabricius) in size and body proportions.

Prostomium rectangular, slightly longer than wide, with a circular depression at its median, posterior margin; nuchal papillae circular, inserted at postectal margin of prostomium; ventral antennae more than twice as large as dorsal antennae.

Proboscis with 20 bifurcated, terminal papillae; with 22 rows of subterminal papillae, 4 or 5 in a row; a conspicuous, median dorsal papilla exceeding the paired papillae in size. Proximal portion of proboscis provided with well separated, minute, prickly cones.

Recurved cirrus first present from eighth or ninth setiger, increasing in size from a minute, triangular lobe about as large as its dorsal cirrus to a thickened, sickle-shaped cirrus (fig. 67, *b*, *c*) at twentieth setiger; continuing large through median region; decreasing gradually in size in posterior fourth and present only as a minute knob on twentieth last setiger (fig. 67, *d*); absent from more posterior segments.

Parapodia as in figure 67, *a–d*; acicular lobes strongly bilobed in anteriormost segments (fig. 67, *a*, *b*), becoming only slightly bilobed in median region (fig. 67, *c*), distinctly conical in posterior region (fig. 67, *d*). Setae of three kinds: (1) Barred setae in preacicular fascicles of notopodia and neuropodia, (2) capillary setae, and (3) bristled setae in postacicular fascicles. Lyre setae not observed.

Holotype.—U.S.N.M. no. 20321.

Distribution.—*Albatross* station 3210 (1890) south of Alaska Peninsula, in 483 fathoms (type); station 4197 (1903), Gulf of Georgia, in 31–90 fathoms. Central California: *Albatross* station 3193 (1890) dredged; station 3666 (1890) in 68 fathoms; station 3202 (1890) in 382 fathoms; station 4485 (1904) in 108 fathoms.

Systematic position.—*Nephtys punctata* belongs to the *N. caeca* group. It is unique in the distribution of its recurved cirri (see above), in the nature of its proboscis, and in having conical acicular lobes in the posterior region.

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